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## **ENVIRONMENTAL PROTECTION EXPENDITURES: AN APPLICATION OF SERIEE IN AUSTRALIA**

Submitted by the Australian Bureau of Statistics<sup>1</sup>

*Abstract: This paper outlines the Australian Bureau of Statistics' (ABS) experience in producing environment protection expenditure statistics for Australia for the years 1995-96 and 1996-97. The ABS has been producing environment protection expenditure statistics for Australia since the 1990-91 financial year. This latest collection cycle was the first attempt to compile and present statistics in accordance with the SERIEE framework. Some summary results and main findings are presented, and problems and issues encountered in compiling these estimates are discussed in some detail.*

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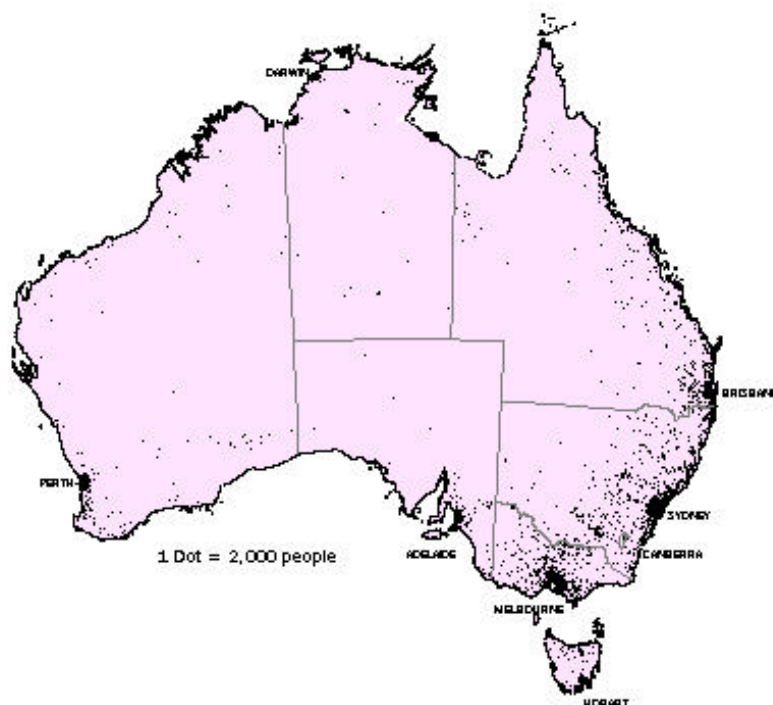
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## 1. INTRODUCTION

### Background and Australia's environmental issues

The Australian land mass is very old in geological terms. It is predominantly dry, and characterised by relatively infertile soils. These features have contributed to the vulnerability of the continent in relation to various forms of land use and, as a consequence, has resulted in serious and widespread land degradation. Australia's population has just reached 19 million, most of which is concentrated in two widely separated coastal regions. By far the largest of these, in terms of area and population, lies in the south-east and east. The smaller of the two regions is in the south-west of the continent. In both coastal regions the population is concentrated in urban centres, particularly the State and Territory capital cities. Half the area of the continent contains only 0.3% of the population, and the most densely populated 1% of the continent contains 84% of the population. This also places great stress on these areas, and on the areas that service them, such as water catchments and leisure areas. The distribution of Australia's population is shown in map 1.

Map1. Population Distribution, Australia---1998



Fossil fuels provide around 94% of Australia's energy needs and much of Australia's economic activity is energy intensive in nature. The large distance between settled areas also contributes to relatively high levels of energy use per capita due to transport of people and freight.

Australia's biodiversity is considered exceptional because of its species richness and the high proportion of species and families unique to this continent. An estimated one million species live in Australia, of which only about 15% have been formally described. However, Australia has a poor record of biodiversity decline, and has the worst record of any nation for conserving its mammal species. Eighty-five to ninety per cent of Australia's temperate woodland ecosystems have been replaced with a highly modified agricultural landscape. One of the highest concentrations of extinct and threatened birds of any habitat in Australia is that of the temperate woodlands ecosystem (SoE 1996). Forested land is estimated to be around 20% (approximately 156 million hectares), with the overall reduction of forest cover from 1788 to 1980 estimated to be around 36%.

### **History of environment protection expenditure collection**

The ABS began collecting statistics on expenditure to protect the environment in 1990-91 in response to both national and international demands for better economic information on the environment. Primarily, they were intended to: 1) be indicative of the response of various sectors to environment protection regulations and policies; 2) input to the environment satellite accounts proposed as part of the revised System of National Accounts; and 3) provide some indication of the flow-on demand on the suppliers of goods and services for environment protection. Previous editions of Environment Protection Expenditure have been based on the OECD's pollution and control (PAC) framework. This followed a relatively simple presentational format in which capital and current expenditure was presented by industry (manufacturing, mining, agriculture, utilities and other service industries) and the public sector. Subsidies and transfers were identified where possible, and State information presented where available.

### **Recent developments**

Over the past few years, the ABS has been moving towards the collection of more comprehensive information relating to environment protection expenditures, guided by the more analytical framework specified in SERIEE. SERIEE also provides for the treatment of the environment protection industries as a distinct group, an issue which had not been addressed previously.

A potential strength of SERIEE is its comprehensive nature and compatibility with the System of National Accounts (SNA). A long term aim of the EPE account is therefore to provide high level decision-makers with an information tool that allows for the assessment and manipulation of policies, legislation, market forces and related economic instruments, in a way that improves both economic and environmental outcomes.

Since 1995-96, ABS survey questions relating to environment protection expenditure have been asked in a format that has enabled partial compilation of the three basic tables specified by SERIEE. These tables are: Table A - National expenditure by components and by users/beneficiaries of environment protection goods and services; Table B - Production of environment protection goods and services; and Table C - Financing of national expenditure for environmental protection (Appendix 1). This information was published in *Environment Protection Expenditure, Australia - 1995-96 and 1996-97* in July 1999.

## **2. SCOPE**

The scope of statistics collected was based on the definition of environment protection as outlined in SERIEE. That is, expenditure aimed at "*all actions and activities that are aimed at the prevention, reduction and elimination of pollution as well as any other degradation of the environment*". This fairly broad definition of what constitutes environment protection is conceptually narrowed in SERIEE by the application of a *primary purpose* criterion to any actions or activities that would otherwise meet the above definition. Primary purpose in this context means that environmental protection must be the main objective or reason behind any action or activity before expenditure linked to these activities is included in the accounts. Actions and activities which have a favourable impact on the environment but which serve other goals do not come under environment protection.

To further define the types of activities included within the scope of activities, the ABS was guided by the *Single European Standard Classification of Environmental Protection Activities* (CEPA), and their classification of activities on the basis of their domain ie the environmental media or type of pollution/degradation. Appendix 2 provides a detailed description of this classification system.

There was one instance in which the ABS intentionally deviated from the narrow definition of environmental protection as specified by SERIEE. This deviation was in relation to soil and groundwater protection in the agriculture industry. This was due partly to the difficulty of making an obvious distinction between a transaction made *primarily* for environment protection in its strictest definition, and other activities which resulted in environment protection, yet were made primarily for the purpose of managing the land sustainably for commercial benefits. In addition, previous collection experience indicated Australian farmers were fairly unresponsive to questions using the term environment protection. Given the importance and large scale of land and soil degradation in Australia, and the scarcity of productive soils (only 6% of Australia's land is arable), the scope was broadened in this instance to include agricultural expenditure relating to sustainable land management.

In the past, the ABS has concentrated on that component of maintenance costs which can be allocated a 'real' market cost. Complete valuation of maintenance costs however would include expenditure that is less readily given a figure, such as the cost of reducing or abstaining from an economic activity (i.e. value added foregone). Although a range of methods have been developed to estimate or model a more complete valuation of environmental protection, these approaches are beyond the scope of SERIEE.

Institutional sectors covered included the corporate sector - both public and private; the three levels of general government - Commonwealth, State and local; and the household sector.

### **3. COVERAGE**

#### **Environment protection industries**

The environment protection industries (or 'specialised producers') were limited to: the waste management industry; the waste water management industry; and, lastly, all other general government activities relating to environment protection.

The waste management industry was comprehensively surveyed in the 1996-97 financial year and the methodology is detailed in a paper presented at the *ECE/Eurostat Working Session on Methodological Issues in Environmental Statistics* last year (1998). Coverage included businesses (the corporate sector) 'mainly engaged in collecting or disposing of refuse (except through the sewerage system)'. This group was relatively easy to identify as it relates to a specific group in the *Australian and New Zealand Industry Classification* (ANZSIC) (9634). The waste management component of Local Government Authority's (LGAs) was also surveyed. State and Commonwealth government bodies were found to have little or no direct involvement in the waste industry other than legislative and regulatory.

Coverage of the waste water management industry included fully corporatised bodies, corporatised public sector trading enterprises, State general government water and sewerage authorities, and local government sewerage operators.

Expenditure on environment protection activities by all levels of government were also recorded under the banner of 'environment protection industries'. As such, all these activities of general government were treated as discrete economic units whose primary purpose was environment protection.

At this point in time no other environment protection 'industries' are able to be distinguished and their transactions separately identified. As such, these figures are expected to be underestimates for this industry group.

#### **Other industries**

Coverage of environment protection expenditure by industries whose primary purpose is something other than environment protection (yet still use and/or produce environment protection goods and services in their production process) is comprehensive. This information is wholly sourced from data items added to existing ABS surveys. Coverage includes: manufacturing, mining, utilities (electricity, gas and water), agriculture, construction and service industries. Coverage for this group of industries is limited to businesses that appear on the ABS Business register ie businesses with 1 or more employees. This also includes non profit institutions serving households (NPISHs), which are not separately identified and presented.

## **Households**

Full coverage of the Australian economy is made complete by estimates of expenditure on environment protection activities by the household sector. In practice, estimates primarily relate to sewage and household garbage collection rates and fees paid by households.

## **4. DATA COLLECTION STRATEGIES**

The Environment and Energy Statistics Section (EESS) used a number of sources and strategies to compile national estimates of environment protection expenditure. These included: utilising the results of existing ABS surveys (such as the 1996-97 Waste Management Industry survey and the ABS *Water and Sewerage Survey*); developing specific EPE questions and attaching them to existing ABS industry surveys (eg manufacturing, mining etc); utilising non-ABS sources such as annual reports and Budget Paper estimates (for general government transactions); and developing our own tailor-made survey as in the case of local government. Many of these data compilation and collection strategies have been outlined previously (see recent ECE/Eurostat papers - *1996-97 Waste Management Industry Survey* (ABS 1998) and *Data Collection Using ABS Surveys: How to get Environmental Information using Existing Collections* (ABS 1997)). As such, these methodologies will not be repeated except in summary. The emphasis in this section, therefore, will be on the EESS experience in developing and compiling local government estimates in the *Environmental and Natural Resource Use and Management Survey* for local government.

### **Waste Management Industry Survey**

As mentioned previously, methodologies relating to the 1996-97 *Waste Management Industry Survey* was the subject of the paper delivered by the ABS in 1998. Data from the Waste Industry Survey fed back into the Environment Protection Expenditure Account (EPEA) and enabled reliable and comprehensive estimates to be reported for the production of goods and services by the Waste Management Industry - by both the private sector and local government. Gross capital formation for this industry was also reported.

### **Waste Water Management Industry**

For the 1995-96 and 1996-97 financial years, specialised production by the waste water management industry was sourced from a combination of the ABS *Water and Sewerage Survey*, and supplementary information derived from: 1) preliminary estimates of EESS local government *Environment and Natural Resource Use and Management survey*, and 2) published estimates of water and waste water operators by industry groups and annual reports.

Supplementary data sources were needed as the ABS *Water and Sewerage Survey* was not designed to provide detailed estimates of the sewerage industry, split by institutional sector and level of government. The small sample size was thus supplemented by 1) local government estimates and 2) published industry estimates, where these units did not appear in the ABS *Water and Sewerage Survey*. Weights were adjusted accordingly and aggregates for the whole waste water management industry were estimated. In this instance, no institutional sector splits were derived due to the fact that the data quality did not lend itself to further disaggregation.

Estimates of waste water management expenditure represent activity-based expenditures by water and sewerage operators to the extent that it was possible. This strategy was adopted in Australia as many operators engage in both water supply and sewerage operations and the industry class distinction is often arbitrary and do not truly reflect the activities undertaken. Where the sewerage component of a business or unit classified to a Water Supplier ANZSIC (3701) could be identified or estimated, this expenditure was included in the waste water management estimates. Where a unit was classified to Sewerage ANZSIC (3702), all transactions of this unit were included under waste water management. Future EPEAs will address this rather ad-hoc approach to collecting estimates for this environment protection 'industry'.

### **Other ABS industry collections**

As mentioned previously, in the 1995-96 collection round, EPE questions on non-environment industry surveys were adapted or extended to better cover the data requirements of SERIEE. Specifically, questions were asked to identify the value of total production of environment protection goods and services both for sale to others (secondary output) and for internal use (ancillary output). The new version also allowed for the distinction between the consumption of market environment protection goods and services (payments to contractors/agencies), and own account expenditure for the purpose of environment protection. A separate collection form was instituted as a supplement to the main form in each of the subject matter collections, except the agricultural finance survey (which is administered by field interviewers). The survey was titled *Waste Management and Environment Protection Survey* so that respondents were clear that waste expenditures were to be included. All processing work is undertaken by the subject matter areas and EESS were delivered final weighted unit record file estimates for manipulation.

### **General government environment protection expenditure**

General government is a major contributor to EPE, particularly as a producer (or supplier) of environment protection goods and services. Commonwealth and State governments primarily serve a policy and regulatory role, with environment departments and agencies being the major stakeholders. Other relevant departments include government bodies relating to agriculture and primary industries and other land management agencies.

Previously, the bulk of Commonwealth and State government expenditures have been sourced from unpublished ABS Public Finance statistics. This group of expenditures was termed 'sanitation and protection of the environment' and enabled estimates - at each level of government - to be made for: 1) household garbage; 2) other sanitation; 3) sewerage; 4) urban stormwater drainage; and 5) protection of the environment not elsewhere classified.

In recent years, this classification system (Government Purpose Classification) has been revised, and since 1995-96 the above splits have not been available. As such, all Commonwealth and State government estimates have been sourced from budget paper documents and departmental annual reports. Currently, no organised system is in place for the Commonwealth and State government bodies to deliver these estimates to the ABS and these estimates are extracted manually by EESS staff.

### **Local government data collection**

The revision to the GPC resulted in no comprehensive data source being available to extract sufficiently detailed environment-related expenditure by the more than 700 Local Government Authorities (LGAs) operating in Australia.

It was at this point in time that the ABS was approached by the Australian Centre for Regional and Local Government Studies (ACRLGS) to become involved in their Local Government Environmental Accounting project. One of the objectives of the Environmental Accounting project was to influence local government accounting systems such that councils were able to identify environmental transactions. The ABS took this opportunity to guide the development of a questionnaire that would suit EESS reporting requirements for both an EPEA and a natural resource use and management account (NRUMA) for local government.

EESS had not previously been significantly involved in survey process functions such as sample methodology, dispatch, collation, input editing, compilation and estimation, and query response. These functions are normally performed by subject matter areas with EESS being delivered the preliminary and final files for manipulation.

This initial collaboration effort resulted in 2 pilot tests of the local government *Environment and Natural Resource Use and Management Survey* - targeting 21 councils in 1995-96 and 110 councils in 1996-97. In 1997-98, EESS proceeded to embark on a full voluntary survey, changing the sampling pattern to a more statistically robust methodology based on pilot survey results. See Appendix 3 for stratum ranges for 1997-98 collection.

Three hundred and eleven councils were selected and survey selection was representative of all State

and Territories and covered approximately 32% of the total council areas (map 1) and 87% population coverage. Councils were sent a survey questionnaire, a guide on how to fill in the form and 2 articles on environmental accounting, as well as assistance in the form of a telephone dial in service and email inquiry access.

## 5. STATISTICAL OUTPUT AND RESULTS

The combined output from all the various data sources was published in *Environment Protection Expenditure, Australia: 1995-96 and 1996-97*. Although 1995-96 data had been published previously, data were re-compiled and presented in a format consistent with 1996-97. This provided a bridging year (1995-96) where the data were presented in both frameworks to allow users to see differences in presentation/methodology.

### Summary results

Table 1 and Figure 1 present summary information for 1996-97. Total national expenditure for environment protection was estimated at \$8.6b in 1996-97. This represented approximately 1.6% of gross domestic product in this year. The majority of national expenditure to protect the environment was on waste water management and water protection (\$3.0b in 1996-97) and waste management activities (\$2.5b in 1996-97). Together these represented around 63% of environment protection expenditure.

Expenditure to protect biodiversity and landscape contributed a further 18% to total expenditure (\$1.5b), with protection of ambient air and climate, and soil and groundwater representing only about 6% and 4%, respectively.

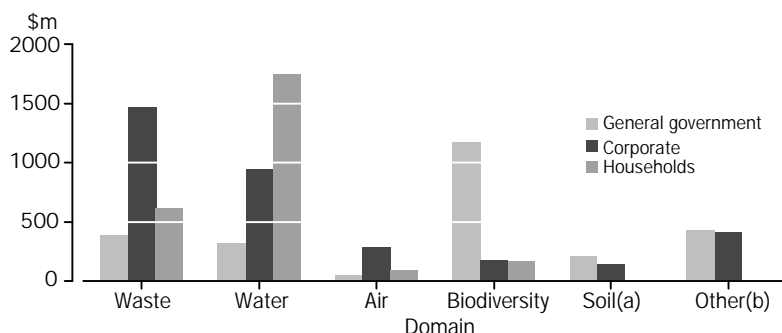
The remainder (less than 10%) was expenditure for research and development, noise and vibration abatement and expenditures on other environment protection activities not able to be separately identified and allocated to a specific domain.

**Table 1. National Environment Protection Expenditure, By Environmental Domain - 1996-97**

	Waste management	Waste water and water protection	Air and climate	Biodiversity and landscape	Soil and groundwater	Other	Total
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
General government	269 386	208 076	45 623	1 056 942	200 239	389 431	2 169 697
Households	617 400	1 749 900	100 000	168 700	300	1 400	2 637 700
Total final consumption	886 786	1 957 976	145 623	1 225 642	200 239	390 831	4 807 397
Intermediate consumption (all industries)	1 194 716	431 520	61 454	153 010	82 085	308 283	2 231 068
<b>Total consumption</b>	<b>2 081 502</b>	<b>2 389 496</b>	<b>207 078</b>	<b>1 378 651</b>	<b>282 624</b>	<b>699 114</b>	<b>7 038 465</b>
Gross capital formation:							
General government	113 151	107 395	3 088	115 201	2 969	40 465	382 269
Corporate (public and private)	271 988	513 271	229 645	19 008	58 705	108 159	1 200 774
<b>Total</b>	<b>385 139</b>	<b>620 665</b>	<b>232 733</b>	<b>134 209</b>	<b>61 674</b>	<b>148 624</b>	<b>1 583 043</b>
National expenditure(a):							
Current	2 082 056	2 397 593	207 127	1 379 193	285 399	699 162	7 050 530
Capital	385 140	620 666	232 733	134 209	61 674	148 624	1 583 043
<b>Total</b>	<b>2 467 196</b>	<b>3 018 259</b>	<b>439 860</b>	<b>1 513 402</b>	<b>347 073</b>	<b>847 786</b>	<b>8 633 573</b>

(a) Includes subsidies

**Figure 1. Environment Protection Expenditure, By Sector and Domain - 1996-97**



(a) Low household expenditure in Soil and Goundwater Protection and Other EPE..

(b) Includes noise and vibration abatement and research and development.

Source: *Environment Protection Expenditure, Australia (4603.0)*

### Main findings

- General government spent approximately 30% (\$2.6b) of national expenditure for environment protection in 1996-97. The largest expenditure was for activities aimed at the protection of biodiversity and landscape (\$1.2b).
- General government provided around 43% of total environment protection services and products produced. Over half of this production was for services and products provided either free or at minimal cost to the community (non-market).
- Expenditure on environment protection by Australian households was \$2.6b in 1996-97. Most of this was spent on waste water services such as sewerage rates and charges, septic systems and urban stormwater drainage (\$1.7b). This represented 58% of total national expenditure on waste water management and water protection.
- The corporate sector accounted for 40% of total national expenditure to protect the environment (\$3.4b in 1996-97). About 42% of total expenditure by the corporate sector was for waste management activities (\$1.5b).
- Within the corporate sector, service industries spent the most on waste management activities (\$948m).
- Manufacturing industries spent the most on waste water services and water protection (\$271m), with a large proportion of this being capital investment (\$128m). Manufacturing also invested heavily in equipment and activities to protect ambient air and climate (\$203m).
- For the corporate sector, protection of soil and groundwater was largely the domain of agricultural industries. Agriculture spent \$102m in 1996-97 on measures to protect soil and groundwater.
- Most environment protection expenditure by the mining industries was for waste water management and water protection (\$90m in 1996-97) and protection of biodiversity and landscape (\$99m).
- Overall, the corporate sector provided environment protection services to the value of \$4.6b in 1996-97 (approximately 56% of total environment protection services and products produced). The majority of this was the provision of waste management and waste water management services by these industries (\$3.3b in 1996-97).

### Estimates of Use, production and financing of environment protection goods and services

Table 2 shows who is using, or consuming, environment protection services and products. These uses include:

- final consumption of products and services by households to mitigate the impacts their activities

have on the environment. This often takes the form of fees and charges for environment protection services provided by government or business;

- intermediate consumption of products and services by industries to mitigate the impacts of their production on the environment.
- This can take the form of payments to government agencies or private contractors, or own account expenditure for internal use of environment protection services; and
- final consumption by general government in their capacity as a collective consumer of environment protection services on behalf of the community.

By definition, the unit investing in environment protection activities (capital expenditure to protect the environment) is also regarded as the user of that investment (the first three columns). Information on connected and adapted products was not collected, and neither was the distinction made between non-specialised and non-characteristic producers. Instead, transactions of other producers were combined.

**Table 2. National Environment Protection Expenditure, By User of Products and Services – 1996-97**

	ENVIRONMENT PROTECTION INDUSTRIES(a).		OTHER PRODUCERS	CONSUMERS(b)				TOTAL
	General government	Other	Total industries	Common-wealth	State	Local	Households	
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Market	..	..	..	..	..	..	2 637 700	2 637 700
Non-market	..	..	..	597 564	1 241 508	330 625	n.a.	2 169 697
Total final consumption	..	..	..	597 564	1 241 508	330 625	2 637 700	4 807 397
Market	(c)	(c)	1 483 689	..	..	..	..	1 483 689
For internal use	(c)	(c)	747 379	..	..	..	..	747 379
Total intermediate consumption	(c)	(c)	2 231 068	..	..	..	..	2 231 068
Total consumption	..	..	2 231 068	597 564	1 241 508	330 625	2 637 700	7 038 465
Gross capital formation	382 269	414 153	786 621	..	..	..	..	1 583 043
Subsidies	(c)	(c)	12 065	..	..	..	..	12 065
National expenditure:								
Current	..	..	2 243 133	597 564	1 241 508	330 625	2 637 700	7 050 530
Capital	382 269	414 153	786 621	..	..	..	..	1 583 043
<b>Total</b>	<b>382 269</b>	<b>141 153</b>	<b>3 029 754</b>	<b>597 564</b>	<b>1 241 508</b>	<b>330 625</b>	<b>2 637 700</b>	<b>8 633 573</b>

(a) Primarily waste management and waste water management.

(b) General government as collective consumers; households as actual consumers.

(c) Transaction may exist but is not recorded here due to SERIEE's accounting conventions.

The units which consume environment protection products and services, or invest for environment protection, may not necessarily bear the full cost of the activity from their own resources. Table 3 presents the actual financing of national expenditure on environment protection by institutional sector, taking into account subsidies, grants and other transfers where these have been identified. There may be transfers between institutional sectors that have not been able to be identified and extracted.

**Table 3. Financing of National Expenditure for Environment Protection, By Source and User - 1996-97**

	ENVIRONMENT PROTECTION INDUSTRIES(a)		OTHER PRODUCERS	CONSUMERS(b)				TOTAL
	General government	Other		Commonwealth	State	Local	Households	
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<b>General government</b>								
Commonwealth	11 408	-	n.a.	580 317	89 853	813	n.a.	682 391
State	126 959	-	n.a.	17 247	1 151 655	19 924	n.a.	1 315 785
Local	240 931	-	n.a.	-	-	309 888	n.a.	550 819
<b>Total</b>	<b>379 298</b>	<b>-</b>	<b>17 648</b>	<b>597 564</b>	<b>1 241 508</b>	<b>330 625</b>	<b>n.a.</b>	<b>2 566 643</b>
<b>Corporations</b>								
Environment protection industries	n.a.	414 153	-	n.a.	n.a.	n.a.	n.a.	414 153
Other producers	n.a.	..	3 012 106	n.a.	n.a.	n.a.	n.a.	3 012 106
<b>Total</b>	<b>2 971</b>	<b>414 153</b>	<b>3 012 106</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>3 429 230</b>
<b>Households</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>2 637 700</b>	<b>2 637 700</b>
<b>National expenditure</b>	<b>382 269</b>	<b>414 153</b>	<b>3 029 754</b>	<b>597 564</b>	<b>1 241 508</b>	<b>330 625</b>	<b>2 637 700</b>	<b>8 633 573</b>

(a) Primarily waste management and waste water management.

(b) General government as collective consumers; households as actual consumers.

Note: Sums will not necessarily equal totals as some splits not available.

Table 4 summarises the production of environment protection services for Australia. It describes who is providing the environment protection service and what type of output they are producing (market, non-market, or for internal use). The environment protection industries consisted primarily of waste management services and waste water management services (sewerage operators). Table 4 also shows the inputs in the form of current uses received and consumed in the production of the environmental output, as well as investment by government and industry for environment protection activities. It should be noted that some of the inputs may include resources utilised for non-environmental protection activities. These amounts have not specifically been identified and deducted.

Although non-environmental output was collected, the decision was made to exclude this information from this edition. The lack of transparency in this table as originally described in SERIEE was seen as a particular problem in presenting information that was clear and understandable to most readers. For this reason, all tables were kept as simple as possible so as not to alienate users.

**Table 4. Production of Environment Protection Services, Summary - 1996-97**

	ENVIRONMENT PROTECTION INDUSTRIES(a)		OTHER PRODUCERS		TOTAL
	General government	Other	For sale(b)	For internal use	
	\$'000	\$'000	\$'000	\$'000	\$'000
<b>OUTPUT</b>					
Environment protection:					
Non-market	1 961 621	..	..	..	1 961 621
Market	1 662 497	3 329 162	550 305	..	5 541 964
For internal use	n.r.	n.r.	n.r.	747 379	747 379
<b>Total</b>	<b>3 624 118</b>	<b>3 329 162</b>	<b>550 305</b>	<b>747 379</b>	<b>8 250 964</b>
<b>INPUTS</b>					
Intermediate consumption	2 292 876	2 621 521	n.r.	(d)822 439	5 736 836
Compensation of employees	918 886	635 521	n.r.	n.a.	1 554 407
Consumption of fixed capital	184 368	301 209	n.r.	n.c.	485 577
Other taxes on production	21 342	297 523	n.r.	35 597	354 463
Less other subsidies	9 851	538	n.r.	10 174	20 564

Environment protection income:					
Market output	1 662 497	3 329 162	550 305	..	5 541 964
Current transfers	127 837	n.a.	n.a.	n.a.	127 837
<i>Total</i>	<i>1 790 334</i>	<i>3 329 162</i>	<i>550 305</i>	<i>..</i>	<i>5 669 801</i>
<b>CAPITAL TRANSACTIONS</b>					
Gross fixed capital formation	382 206	426 577	n.r.	681 432	1 490 215
Other capital uses	63	-12 424	n.r.	n.a.	-12 361
<i>Total</i>	<i>382 269</i>	<i>414 153</i>	<i>n.r.</i>	<i>681 432</i>	<i>1 477 854</i>
Investment grants received	15 710	-	n.r.	5 581	21 291

(a) Primarily waste management and waste water management.

(b) Not collected for agriculture.

(c) Transaction may exist but is not recorded here due to SERIEE's accounting conventions.

(d) Includes compensation of employees.

Results were also presented in a format consistent with previously published EPE data ie capital and current expenditure by industry.

### Local government survey results

The 1997-98 voluntary local government survey resulted in a 65% response rate, or the return of approximately 200 survey forms. Derived estimates were of good quality at the national level and the 1997-98 survey results were used to backcast some of the domain estimates for inclusion in *Environment Protection Expenditure, Australia: 1995-96 and 1996-97*. Detailed EPE and NRUM estimates produced from the 1997-98 survey will be published in Cat. 4611.0 in November 1999.

Table 5 presents summary results from this survey (see Appendix 4 for a description of the activities). At \$2.1bn, EPE accounted for 61% of total environment-related expenditures. The remaining 39% was spent mainly on inland water management and land management activities (\$681m and \$638m respectively). Income derived from rates for environment-related activities and other environmental activities totalled \$2.7bn. Total EPE and NRUM expenditures by local governments represented just under 50% of total council expenditure. Total income for the above activities represented approximately 22% of total council income from rates, services and other government funding.

**Table 5. Environment-related Transactions for Local Government, Summary - 1997-98**

	Income		Expenses	
	\$m	per capita	\$m	per capita
Environment protection	1,750	117	2,140	135
Natural resource use and management	929	63	1,348	90
<i>Total</i>	<i>2,679</i>	<i>180</i>	<i>3,488</i>	<i>225</i>
<b>Environment Protection</b>				
Waste water & water protection	811	61	924	65
Solid waste management	844	51	941	54
Biodiversity and landscape protection	40	3	91	6
Protection of soil & groundwater	11	<1	26	1
Protection of ambient air and climate	n.p	<1	6	1
Protection of cultural heritage	n.p	<1	30	2
Other environment protection	40	2	118	6
<b>Natural Resource Use &amp; Management</b>				
Inland water management	693	46	681	47
Land management	210	16	638	41
Other resource management	26	1	54	2

### EPE

Figure 2 shows that the bulk of environment protection activity is on waste water management and water protection and non-hazardous waste management. Together these represented 87% of total EPE by local government, and 95% of total income for environment protection purposes. Of the remaining domains, activities relating to protection of biodiversity and landscape resulted in 4% of total EPE, with a high proportion of this being for capital expenses.

**Figure 2. Environment Protection as a percentage of Total Transactions, 1997-98**

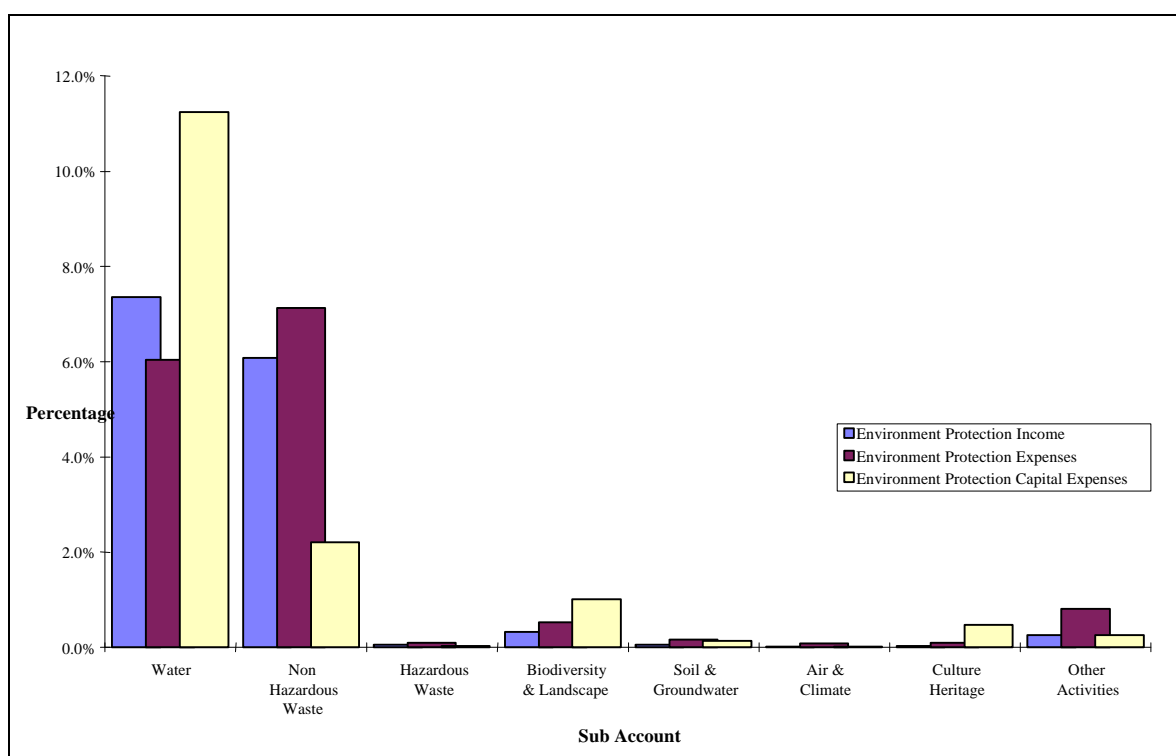


Table 6 presents local government environment-related transactions by region. For environment protection (mainly waste water management and waste management), per capita income and expenditures for the provision of these services are considerably higher for both provincial city councils and fringe metropolitan city councils, than for either rural and metro city councils (see Appendix 4 for descriptions of regions). Per capita transactions for inland water and water management were more consistent across regions.

**Table 6. Local Government Environment-related Transactions, By Region - 1997-98**

	Income \$m	per capita \$	Expenses \$m	per capita \$
Environment Protection				
Rural council	72	86	82	98
Provincial city council	157	166	151	160
Fringe metropolitan city council	278	164	288	171
Metropolitan city council	438	95	465	123
Natural Resource Use & Management				
Rural council	65	78	76	91
Provincial city council	85	90	110	116
Fringe metropolitan city council	128	76	134	80
Metropolitan city council	232	51	406	88

The local government *Environment and Natural Resource Use and Management Survey* is to be run again in 1998-99 as a compulsory survey. This collection is being tabled in parliament and is planned to be conducted annually. The survey will focus on Local Government's specialised role as providers of environmental management services at the local level. A long term goal of the survey is to provide Local governments and associated organisations in Australia with the impetus and national context in which to develop and implement an agreed set of environmental accounting standards.

## 6. PROBLEMS ENCOUNTERED

There are a number of conceptual and practical difficulties associated with the collection and presentation of EPE statistics consistent with SERIEE. These include:

- balancing the data intensive demands of the framework with limited resources and respondent burden issues;
- ambiguity between EPE and expenditure on NRM and human health measures;
- the use of specialist language and concepts unfamiliar to users and respondents;
- uncertainty of evaluating the strategic impact and direction of the EPE account;
- potential inconsistencies in using budget papers and financial reports to derive EPE data;
- information gaps and definitional problems relating to environmental taxes, subsidies, levies and rates;
- valuation issues (total vs marginal costs);
- insufficient links between EPE and supporting information;
- tensions between value adding and the need for timely statistics;
- the inadequacy of existing classifications to capture the environment protection industry.

### **Fundamental concerns**

Perhaps the most fundamental problem faced in compiling the EPEA was the presentation of relatively complex ideas and terminology in a format that was reasonably user-friendly. As a consequence of using a framework consistent with the System of National Accounts (SNA), as well as an elaborate accounting framework to avoid double-counting (inherent in SERIEE), the resulting output was potentially complicated and difficult to interpret. Add to that the breakdown of information into 7 different domains, by industry, by level of government, and the volume of information generated was considerable. EESS addressed this by simplifying, where possible, the presentation of the tables and the terminology used therein to produce a product that would be less likely to alienate traditional users and also produce more sophisticated information for other users. Ultimately, the extent to which the SERIEE framework was used as an analytical tool was diminished in this particular exercise due to information gaps and a lack of established links with physical data.

Given that one of the main strengths of SERIEE is seen to be in its functioning as a bridge between physical and economic data, maximising useability of the results would be made by optimising these linkages. Indeed, SERIEE (1994) acknowledges that these linkages are "indispensable for a variety of uses of the system". This was not a priority for this first attempt at compiling the EPEA based on SERIEE and, as such, the emphasis in this product is on valuing the net cost of environmental protection measures borne by producers, and the value of the activities linked to environmental protection so as to determine the market for these goods and services.

Ideally, SERIEE's strategic relevance as a research framework should be assessed against its relative importance to national policy formulation and evaluation and/or the probability that it will become more prominent in these processes over time. The potential to influence high level thinking and macro-economic strategy is probably dependant on the detail of SERIEE being complete and the linkages being made, which has not been possible to date due to gaps in data and information. This information gap is particularly important in relation to environment-related taxes and subsidies, which are the main tools available to economists in a position to adjust or fine tune environment-related expenditures. The calculation of environment-related financial burden requires comprehensive data on environment-related taxes, subsidies, investment grants etc. Unfortunately, this is one area in which the available information is sparse and of poor quality, and steps need to be made to rectify this data gap if EPE reporting is to influence policy at this level. Until then, EESS will work to determine the appropriate level at which to collect and present data to suit all users, including industry groups, Environment Protection Authorities, environment and primary industry departments, and policy-makers. If the report is intended to reach a wider audience, the language, terminology and concepts of EPE need to be presented in a clearer and more understandable style. In addition, value-adding to produce a more analytical document must be balanced with the need for timely statistics.

### **Conceptual**

The aggregation of EPE data into domains (i.e. SERIEE sub-accounts) proved problematic to the extent that the placement of transactions into these discrete groupings may have the effect of actually obscuring some dimensions of the relationship between economic activity and environmental degradation. This is because the scope and nature of ecological impacts do not sit neatly in a single nuisance/degradation category. For example, rising sea temperatures linked to global warming have been identified as a major threat to the world's tropical reef systems, including the Great Barrier Reef. Expenditure on actions taken to limit or restrict greenhouse gas emissions, however, are not linked by name to protection of biodiversity and landscape and are classified in the protection of ambient air and climate sub-account instead. Thus the names or labels of the SERIEE domain sub-accounts may imply a separation of impacts and issues that in ecological terms are ambiguous, and may not be easily interpreted or linked to supporting information.

The conceptual split between EPE and expenditure on Natural Resource Management (NRM) was also problematic. There did appear to be a large 'grey' area between EPE and NRM, as much expenditure on NRM was deemed to have significant positive environmental outcomes, although the primary motivation may not be established as defensive (or rehabilitative) expenditure to protect the environment. Examples include such activities identified as 'catchment management planning' and 'rangeland management' - activities identified as being for the ecologically sustainable use and conservation of these resources. This problem is magnified by the fact that the difference between these activities being in or out of scope can make quite a substantial difference to domain expenditures such as soil and groundwater protection and biodiversity and landscape protection, particularly by the government sector.

In addition, this distinction between EPE and expenditure for activities towards the sustainable use and management of resources was not made for the agriculture industry. As outlined previously, these expenditures formed the bulk of reported expenditure by this industry and, given the relevance of soil and land degradation issues in Australia, it was deemed inappropriate to exclude such expenditures. This was in spite of the fact that such expenditures do not fit neatly under the definition of environment protection, as farmers could generally not separate land management expenditure between that which was primarily for environment protection, and that which was for sustainable management for economic benefits.

Finally, the concept of 'extra cost' for integrated facilities proved too difficult to operationalise in this instance. Industry survey questionnaires made a distinction between 'end-of-line' products and techniques and 'change in production/integrated technology/cleaner production processes'. However, no attempt was made to estimate extra cost for the latter. Future collections will look at addressing this issue.

### **Operational**

#### *Environment protection industries*

As well as the above described conceptual issues, many operational problems such as data unavailability, quality and methodologies were faced, not the least of which was identification and capture of the environment protection industry. Although the industry classification (ANZSIC) used by the ABS has the advantage of being compatible with other collection frameworks (a feature which could be important when considering the linkages between EPE and supporting information), it does not identify 'environment' industries as a particular grouping in its own right. Activities within these industries are characterised by waste transport (ANZSIC = road & rail transport), environment services (ANZSIC = business services), environment research and development businesses (ANZSIC = universities, business services), waste management industry (ANZSIC = waste management services); waste water management industry (ANZSIC = sewerage operators) and environment related agencies (usually in the 96xx class, such as zoological parks board). Due to current survey methodology, there is only a small chance of collecting these industries, and when they are collected they tend to become an outlier in the data. The exception, of course, is the waste water industry which is currently collected in the annual *Water and Sewerage Survey*, and the waste management industry which was recently run as a full survey. For this reason, only these two industries have been included under the title of environment protection industries in the figures

relating to the corporate sector.

#### Industry surveys

In some instances, methods used to calculate domain splits for each of the data items (used to derive secondary production, environment protection income, payments to contractors, own account expenditure, taxes, fees and fines etc) were fairly coarse. Total current and capital expenditure for each domain was asked, and these ratios were apportioned across each of the data items. In some cases, tick box questions (relating to expenditure ranges) were asked and estimates made based on these. The level of accuracy reported was balanced by the necessity to keep respondent burden to a minimum.

Another concern was the relatively high proportion of Nil responses reported by both the service industries group, and also the agriculture industry. EESS will further investigate these results to confirm whether or not these are in fact true nil responses, or non-sampling errors of some sort.

Overall, the costs of running supplementary surveys for EPE and compiling the publication are quite high. In addition to EESS staff costs, payments to subject matter areas for collecting and processing activities can be significant. Appendix 5 describes some quotes for the service and other industries.

#### Water and sewerage survey

The ABS *Water and Sewerage Survey* has, in the past, been designed to provide aggregate financial estimates for the water and sewerage sector combined. As such, estimates for the sewerage industry as a specialised producer of environment protection goods and services using this survey vehicle alone were insufficient and additional sources were sought. Regarding the sewerage operations of the water supply industry, EESS provided these units with the *Waste Management and Environmental Protection Survey* questionnaire (provided to all other non-environment industries). It was intended that expenditure relating to the sewerage operations of the unit would be recorded here and hence, EESS would have a more complete picture of the waste water management industry in Australia. Unfortunately, results and discussions with the subject matter area revealed that water operators were not accurately recording their sewerage operations on the supplementary form. This resulted in EESS abandoning the use of the supplementary questionnaire and using the main survey data items to derive sewerage estimates.

#### General government

On the general government side, collation and compilation of Commonwealth and State EPE estimates is made difficult by the varied manner in which budget papers and departmental annual reports are presented, including large variations in the level of detail reported. Much of the estimation is based on a judgement of the amount of activity within a portfolio statement. This is then proportioned over detailed expenditure information from the financial accounts. A particular issue is accurately discerning between sustainable development and environment protection expenditure. The potential for inconsistent reporting between years needs to be carefully avoided by transparent extraction procedures, including detailing sources and methods and any assumptions that have been made, or data quality issues that are apparent, for future account keeping. As well, the same State or department do not necessarily report information in a consistent manner between years. The major benefit of this process is the potential to link the available data directly to policy.

## **7. FUTURE DIRECTIONS**

The EESS is currently undergoing a review of its EPE operations. The 1998-99 reporting cycle was removed from the agenda while EESS, subject matter areas, forms consultancy, methodology and other stakeholders liaise to determine the best way to achieve quality results in the future. Clearly identifying and understanding our target audience would help. Steps to achieve this may include more extensive consultation such as a formal or informal user review of the EPE account to determine actual and potential users. A key step is a continuing dialogue with users of the report (e.g. EPA's) or developing new relationships with other clients, where they are relevant to the strategic aims of the EPE account.

The environment protection expenditure account is likely to be more useful and reach a wider audience if it is more closely linked to environmental policies and outcomes. If the report is intended to reach a wider audience, the language, terminology and concepts of EPE need to be presented in a clearer and more understandable style. One possibility may be to publish two reports, in order to tailor the information presented for specialist and non-specialist audiences. This option could involve the release of a preliminary EPE publication that presents the data in its simplest form, followed by the release at a later date of a more thorough analysis (this is an approach that appears to have worked well for other ABS subject areas). There may also be an opportunity for modelling of some EPE data, which could save time and resources in the long term, once reasonable models have been developed. Modelling would also provide the opportunity to selectively publish forward estimates. This two-stage approach to the release of information would also allow for the compilation of supporting physical data. The feasibility of collecting this information via ABS surveys would need to be investigated in terms of the additional demands on respondents and the ABS in terms of time and resources. However, where the ABS already has such physical data, for example in the case of waste, the linkages should be made with the financial data.

A more thorough analysis of EPE in Australia would also require more work to be done on the information gaps relating to environmental taxes, subsidies and levies. Steps that can be taken in the near future include consultation with; the Commonwealth Government's Treasury Department and the Department of Finance and Administration; Environment Protection Authorities (EPA's) and other relevant State Government agencies and departments; and local government, to seek broad agreement on the definition of environmental taxes and subsidies. A medium term strategic goal in this context, is to include definitions of environmental taxes and subsidies as part of the development of environmental accounting standards.

In terms of opportunities to improve data collection for the general government sector, the development of environmental accounting standards would improve this situation dramatically and the ABS may have an important role in this respect. For example, the local government EPE project has two related goals; the collection of EPE statistics where internal statistics have become deficient; and the implementation of an environmental accounting standard. This exercise has proved very successful and the quality and comprehensiveness of the data are extremely good.

Given operational limits to the capacity of the ABS to fund collection of data, there may be an opportunity to model some aspects of the EPE account, particularly where experience has shown a high non-sample error.

As it stands, a full collection of national EPE statistics will again occur for the 1999-2000 financial year. Developments are currently underway to revise questionnaires relating to the non-environment industries. Future surveys are likely to approach expenditure from a 'type of waste/emission/degradation' being treated perspective. In this manner, data items will be more meaningful to industries and they will not be expected to be familiar with the underlying definitions relating to arbitrary domains.

In summary, the coverage and quality of the data collected will continue to improve, as forms design and question wording are fine-tuned and better ways of extracting data are developed. Broader issues still to be addressed include the strategic aims of the EPEA and the target audience. It is envisaged that this information will be more widely accepted with the development of time-series; with links to regulations and policy; links to physical data and other NRM data or accounts.

## References

Australian Bureau of Statistics 1999, *Environment Protection Expenditure* (4603.0)

Australian Bureau of Statistics 1996, *Australians and the Environment* (4601.0)  
State of the Environment Advisory Council 1996, *Australia - State of the Environment Report 1996*,  
CSIRO Publishing, Melbourne.

**Appendix 1. TABLE A : National expenditure by components and by users/beneficiaries**

year : 1993

in million French Francs

COMPONENTS OF NATIONAL EXPENDITURE FOR ENVIRONMENTAL PROTECTION	USERS/BENEFICIARIES								Total	
	Producers				General government as collective consumer		Households as actual consumers	Rest of the world		
	Specialized producers		Other producers		Central government	Local government				
	General governme nt	Other	non- specialize d	non- charateristic						
<b>1. Consumption of specific products</b>	0	0	2750	1509	411	2056	1260	0	7986	
1.1 Final consumption of environmental protection services					411	2056	1517		3984	
market	-	-	-	-	-	-	1372	-	1372	
non-market	-	-	-	-	411	2056	145	-	2612	
1.2 Intermediate consumption of environmental protection services			2750	1552					4302	
market	n.r	n.r		1552	-	-	-	-	1552	
ancillary	n.r	n.r	2750	-	-	-	-	-	2750	
1.3 Final consumption of connected products adapted products	-	-	-	-	-	-	-257	-	-257	
1.4 Intermediate consumption of connected products adapted products	n.r	n.r	0	-43	-	-	-	-	-43	
<b>2. Gross capital formation for environmental protection activities</b>	955	1200	1525	-	-	-	-	-	3680	
<b>3. Gross capital formation in specific products</b>			0	700					700	
in connected products	n.r	n.r		700	-	-	-	-	700	
in adapted products	n.r	n.r			-	-	-	-	0	
in environmental protection services	n.r	n.r		0	-	-	-	-	0	
<b>4. Specific transfers*</b>	0	0	345	449	0	0	908	0	1702	
4.1 subsidies on production			345	179			908	0	1432	
environmental protection services	n.r	n.r	345	36	-	-	51		432	
adapted and connected products	n.r	n.r		143	-	-	857		1000	
4.2 other specific transfers				270			0	0	270	
current	(-)	(-)	(-)	270	-	-	-		270	
capital	(-)	(-)	(-)		-	-	-		0	
<b>5. Total uses of resident units (1+2+3+4)</b>	955	1200	4620	2658	411	2056	2168	0	14068	
current uses	-	-	3095	1958	411	2056	2168	0	9688	
capital uses	955	1200	1525	700	-	-	-		4380	
<b>6. Financed by the rest of the world</b>									0	
current uses	-	-							0	
capital uses		405			-	-	-		405	
<b>7. National expenditure for environmental protection (5-6)</b>	955	1200	4620	2658	411	2056	2168	0	14068	
current	-	-	3095	1958	411	2056	2168	0	9688	
capital	955	795	1525	700	-	-	-		3975	

nr : not recorded ; "-" : the transaction does not exist ; (-) : the transaction may exist but no example was found

\* not counterpart of items 1, 2, 3

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**TABLE B : Production of environmental protection services**

TRANSACTIONS	PRODUCERS				
	Specialized producers		Non-specialised producers		Total producers
	General government & NPISHs	Other	Secondary output	Ancillary output	
<b>1. CURRENT TRANSACTIONS</b>					
<b>1.1 Current uses</b>					
Intermediate consumption	3246	1500	n.r	2185	6931
of which characteristic services	1565		n.r	n.r	1565
of which adapted and connected products			n.r	n.r	
Compensation of employees	870	445	n.r	800	2115
Consumption of fixed capital	690	350	n.r	460	1500
Other taxes on production	45	25	n.r	105	175
Less other subsidies	87		n.r	345	432
Net operating surplus	0	392	n.r	0	392
<b>1.2 Output</b>	4764	2712	230	3205	10911
Non-environmental output	0	712		455	1167
related products		500	n.r	455	955
other non-environmental output		212	n.r	-	212
Environmental protection output	4764	2000	230	2750	9744
non-market	2612	-	0	-	2612
principal	2612	-	-	-	2612
secondary		-	-	-	0
market	2152	2000	230	-	4382
principal	2152	2000	-	-	4152
secondary			230	-	230
ancillary	n.r	n.r	n.r	2750	2750
<b>1.3 Current environmental protection resources</b>	2152	2000	230	-	4382
Market output	2152	2000	230	-	4382
Current transfers		-			0
<b>2. CAPITAL TRANSACTIONS</b>					
<b>2.1 Gross fixed capital formation</b>	955	1200	n.r	1525	3680
<b>2.2 Other capital uses</b>			n.r		0
<b>2.3 Investment grant received</b>	231	754	n.r		985
<b>2.4 Other capital transfers received</b>		(-)	n.r	(-)	0
<b>3. FINANCING BY PRODUCERS</b>	3336	446	n.r	4275	8057

nr : not recorded ; "-" : the transaction does not exist ; (-) : the transaction may exist but no example was found

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**TABLE B1 : Supply and use table for characteristic services**

	Non-market	Market	Ancillary	Total
1. Use of resident units (purchaser's price)	2612	4719	2750	10081
1.1 Intermediate consumption	-	3117	2750	5867
1.1.1 of which specialized producers	-	1565	n.r	1565
1.1.2 of which other producers	-	1552	2750	4302
1.2 Final consumption	2612	1372	-	3984
1.3 Gross capital formation (land improvement)	-	230	-	230
2. Exports	-	-	-	0
<b>Total uses (1+2) = total supply (3+4+5+6)</b>	2612	4719	2750	10081
3. Output	2612	4382	2750	9744
4. Imports	-	-	-	0
5. Non-deductible VAT	-	337	-	337
6. Other taxes less subsidies on products	-	-	-	0

nr : not recorded ; "-" : the transaction does not exist ; (-) : the transaction may exist but no example was found

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**TABLE C : Financing of national expenditure for environmental protection**

FINANCING UNITS	USERS/BENEFICIARIES								Total	Of which : current expenditure
	Producers				General government as collective consumer		Households as actual consumers	Rest of the world		
	Specialized producers		Other producers		Central government	Local government				
	General government & NPISHs	Other	non-specialized	non-characteristic						
<b>1. General government</b>	851	117	345	643	411	2056	857	0	5280	4082
Central government	292	-	345	643	411	-	857	-	2548	2026
Local government	559	117	-	-	-	2056	-	-	2732	2056
<b>2. NPISHs</b>	-	-	-	-	-	-	145	-	145	145
<b>3. Corporations</b>	36	678	4275	1521	0	0	18	0	6528	4288
Specialized producers	-	446	-	-	-	-	-	-	446	-
Other producers	36	232	4275	1521	-	-	18	-	6082	4288
<b>4. Households</b>	68	-	-	724	-	-	1148	-	1940	1172
<b>NATIONAL EXPENDITURE</b>	955	795	4620	2888	411	2056	2168	0	13893	9688
ROW	-	405	-	-	-	-	-	-	405	-
Uses of resident units	955	1200	4620	2888	411	2056	2168	0	14298	2576

nr : not recorded ; "-" : the transaction does not exist ; (-) : the transaction may exist but no example was found

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**TABLE C1 : Environment-related financial burden**

ELEMENTS OF ENVIRONMENT-RELATED FINANCIAL BURDEN	SECTORS				
	Corporation		Households including NPISHs	General government	Total
	Environmental industries	Non-environmental industries			
1. Financing of current national expenditure	0	4289	1317	4082	9688
2. Nondeductible VAT on current expenditure	-	-	-	-444	-444
3. Taxes on production	-	-	-	-175	-175
4. Net operating surplus	-392	-	-	-	-392
5. Any other profits	-	-	-	-	0
6. Interest on fixed capital	175	230	25	320	750
<b>A Financial burden of environmental protection (1+2+3-4-5+6)</b>					0
<b>B Environment-related tax burden</b>	0	1562	1032	-2594	0
CO2 tax		1500	1000	-2500	0
Water agency		62	32	-94	0
<b>Environment-related financial burden (A+b)</b>	0	1562	1032	-2594	0

nr : not recorded ; "-" : the transaction does not exist ; (-) : the transaction may exist but no example was found

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## Appendix 2. Single European Standard Statistical Classification of Environmental Protection Activities and Facilities

### Classification of Environmental Protection Activities (CEPA)

- 1 Protection of ambient air and climate
  - 1.1 Prevention of pollution through in-process modifications
    - 1.1.1 for the protection of ambient air
    - 1.1.2 for the protection of climate and ozone layer
  - 1.2 Treatment of exhaust gases and ventilation air
    - 1.2.1 for the protection of ambient air
    - 1.2.2 for the protection of climate and ozone layer
  - 1.3 Measurement, control laboratories and the like
  - 1.4 Other activities
- 2 Waste water management
  - 2.1 Prevention of water pollution through in-process modifications
  - 2.2 Sewerage networks
  - 2.3 Waste water treatment
  - 2.4 Treatment of cooling water
  - 2.5 Measurement, control laboratories and the like
  - 2.6 Other activities
- 3 Waste management
  - 3.1 Prevention of waste production through in-process modifications
  - 3.2 Collection and transport of waste
  - 3.3 Treatment and disposal of hazardous waste
    - 3.3.1 Thermal treatment
    - 3.3.2 Landfill
    - 3.3.3 Other treatment and disposal
  - 3.4 Treatment and disposal of non-hazardous waste
    - 3.4.1 Incineration
    - 3.4.2 Landfill
    - 3.4.3 Other treatment and disposal
  - 3.5 Measurement, control laboratories and the like
  - 3.6 Other activities
- 4 Protection of soil and groundwater
  - 4.1 Prevention of pollutant infiltration
  - 4.2 Decontamination of soils
  - 4.3 Measurement, control laboratories and the like
  - 4.4 Other activities
- 5 Noise and vibration account
  - 5.1 Noise and vibration from road and rail traffic
    - 5.1.1 Preventative in-process modifications at the source
    - 5.1.2 Construction of anti-noise vibration facilities
  - 5.2 Air traffic noise
    - 5.2.1 Preventative in-process modifications at the source
    - 5.2.2 Construction of anti-noise vibration facilities
  - 5.3 Industrial process noise and vibration
  - 5.4 Measurement, control, laboratories and the like
  - 5.5 Other activities
- 6 Protection of bio-diversity and landscape
  - 6.1 Protection of species
  - 6.2 Protection of landscapes and habitats, of which
    - 6.2.1 protection of forests
  - 6.3 Rehabilitation of species, populations and landscapes
  - 6.4 Restoration and cleaning of water bodies
  - 6.5 Measurement, control, laboratories and the like
  - 6.6 Other activities

7 Protection against radiation  
(excluding nuclear power stations and military installations)

- 7.1 Protection of ambient media
- 7.2 Measurement, control laboratories and the like
- 7.3 Other activities

8 Research and Development

- 8.1 Protection of ambient air and climate
  - 8.1.1 for the protection of ambient air
  - 8.1.2 for the protection of atmosphere and climate
- 8.2 Protection of ambient water
- 8.3 Waste
- 8.4 Protection of soil and groundwater
- 8.5 Abatement of noise and vibration
- 8.6 Protection of species and habitats
- 8.7 Protection against radiation
- 8.8 Other research on the environment

9 Other environmental protection activities

- 9.1 General administration of the environment
- 9.2 Education, training and information
- 9.3 Activities leading to indivisible expenditure
- 9.4 Activities not elsewhere specified

**Classification of Environmental Protection Facilities**

1 Protection of Ambient Air and Climate

- 1.1 Dedusting equipment and filters  
Industrial establishments equipped for the treatment of exhaust gases
- 1.2 Air monitoring installations [number of measurement sites by type of compound monitored; number of measurements per year; number of mobile equipment]
  - 1.2.1 Stationary sites in built up areas
  - 1.2.2 Stationary sites in open areas
  - 1.2.3 Mobile sites

2 Water Management and Protection

- 2.1 Sewerage networks (in kilometres)
- 2.2 Waste water treatment installations [number; capacity in terms of population equivalents of COD]
  - 2.2.1 Mechanical treatment technology (excluding septic tanks)
  - 2.2.2 Biological treatment technology (excluding septic tanks)
  - 2.2.3 Advanced treatment technology
  - 2.2.4 Septic tanks
- 2.3 Monitoring installations [number of measurement sites; number of mobile equipments; number of measurements per year and by type of water body monitored]

3 Waste Management

- 3.1 Facilities for the treatment of hazardous waste [number; capacity in terms of weight that can be treated by year, by type of waste as applicable]
  - 3.1.1 Physical/chemical treatment technology
  - 3.1.2 Thermal treatment technology
  - 3.1.3 Biological treatment technology
  - 3.1.4 Conditioning of radioactive wastes
  - 3.1.5 Other treatment technologies
- 3.2 Facilities for the treatment of other than hazardous waste [number; capacity in terms of weight that can be treated by year, by type of waste as applicable]
  - 3.2.1 Physical/chemical treatment technology
  - 3.2.2 Incineration of municipal or similar wastes
  - 3.2.3 Incineration of industrial waste
  - 3.2.4 Biological treatment technology
  - 3.2.5 Other treatment technologies
- 3.3 Facilities for the disposal of waste [number of sites]
  - 3.3.1 Landfill for all types of wastes
  - 3.3.2 Landfill exclusively for hazardous waste
  - 3.3.3 Containment / underground waste
  - 3.3.4 Other disposal installations



4 Protection of soil and groundwater

4.1 'End-of-pipe' facilities [number]

4.1.1 Soil surface sealing including ditches and walls, drainage systems

4.1.2 Catchments for run-offs, losses, leaks

4.1.3 Improvement of underground storage and transport facilities in the interest of ground water and soil protection

4.1.4 Removal of underground storage and transport facilities in the interest of ground water and soil protection

4.2 Reservoir liners, reinforcement of transport systems for hazardous products and other integrated facilities [number]

5 Noise Abatement

5.1 Noise barriers: roads, railroads, airports [in kilometres]

5.2 Equipment for follow-up and control of noise [number of sites and measurement equipment]

*Source:* Eurostat (1994) pages 71 - 74

### Appendix 3. Strata and definitions for Local Government Survey

<b>Strata</b>	<b>Description</b>
Rural Council	Generally large area with a high rural component and a low density population
Provincial City Council	Generally a smaller area with a medium density population, classified as a city.
Fringe Metropolitan City Council	Generally a medium to large area with a high population density or high growth rate, close proximity to a metropolitan district.
Metropolitan City Council	Generally a small area with a high population density, classified as a city council and within a city district.

<b>Strata</b>	<b>Council residential population</b>
Stratum 1	0 - 8,000
Stratum 2	8,000 - 21,000
Stratum 3	21,000 - 47,000
Stratum 4	47,000 - 98,000
Stratum 5	98,000 - 300,000
Stratum 6	300,000+

## Appendix 4. Description of Activities and Domains for Local Government Survey

Environment Protection Domain	Activity
Waste Water Management/ Water Protection	<p>Sewerage systems and treatment works</p> <p>Storm water/drainage systems</p> <p>Systems to control, monitor or prevent discharge of waste water into lakes, water courses or ocean outfalls (e.g. gross pollutant traps, street cleaning)</p> <p>Monitoring of waste water from industrial operations</p> <p>Monitoring of cisterns, tanks and septic tanks</p> <p>Measures to prevent soil erosion in water reservoirs (e.g. revegetation of riparian zones)</p>
Non-Hazardous Waste Management	<p>Handling, storage, transport and disposal of non-hazardous waste (eg household and municipal garbage, builders waste and non-haz industrial wastes)</p> <p>Management of municipal tips</p> <p>Monitoring / measuring activities relating to amounts and types of waste collected / disposed of</p> <p>Provision of recycling collection services and stations</p> <p>Public education campaigns</p> <p>Administrative expenses related to any of the above</p>
Hazardous Waste Management	<p>Handling, storage, treatment, transport and disposal of hazardous wastes requiring special treatment (e.g. medical wastes; wastes that are flammable, toxic, poisonous, infectious, corrosive, etc)</p> <p>Special collections of household hazardous wastes (eg paints, solvents, cleaning agents and garden chemicals)</p> <p>Special collections of hazardous industrial waste</p>
Protection of Biodiversity and Landscape	<p>Measures to protect native plants, animals and habitats (e.g. creation and maintenance of nature conservation areas, administration of tree protection regulations, new plantings to create 'green corridors')</p> <p>Measures to protect or restore ecosystems (e.g. wetlands, riverine systems, remnant forest)</p> <p>Measures to protect against soil erosion in protected areas such as nature conservation reserves</p> <p>Measures to control exotic species (e.g. noxious plant control in nature reserves, feral animal baiting and control in nature reserves).</p> <p>Estimation of expenses for fire control in National Parks, crown land and State reserves.</p>
Protection of Soil and Groundwater	<p>Measures to prevent, control or rectify soil erosion, salinity and rising water tables</p> <p>Decontamination of soil (site clean-up)</p> <p>Removal or upgrading of underground storage and pipelines in the interest of ground water and soil protection</p> <p>Measures to control/monitor amounts and toxicity of leakage into soil and ground water.</p>
Protection of Ambient Air and Climate	<p>Measures to protect ambient air and climate such as purchase, cleaning and maintenance of equipment / filters to reduce or eliminate emissions to air (e.g. greenhouse gases, toxic gases, excessive dust or odour)</p> <p>Adoption of 'cleaner technologies'</p> <p>Monitoring, testing of emissions to air.</p>
Protection of Cultural Heritage	<p>Measures related to the conservation of built heritage (including assessments of cultural heritage values for buildings, monuments or sites)</p> <p>Construction and maintenance of fencing to protect built heritage sites</p> <p>Measures to maintain or restore heritage buildings/monuments</p> <p>Educational programs or materials relating to cultural heritage</p> <p>Grants to community organisations to maintain or protect cultural heritage, etc).</p>
Other Environment Protection	<p>Any transaction related to environmental protection but which cannot be broken down into categories one of the categories listed above</p> <p>Noise and vibration abatement such as erection of anti-noise walls, creation of buffer zones, etc in order to protect persons and built up structures from the effects of excessive noise and vibrations caused by construction work, airports, heavy road traffic</p> <p>Measures to protect the environment from radiation</p> <p>Public information and education related to environmental protection in general</p> <p>Expenditure on research and development and administration related to environmental</p>

protection

Payments to environmental consultants and transactions related to environmental impact assessments (e.g. environmental impact assessments of development applications) which are relevant to more than one of the environmental protection categories above

Any other activities not elsewhere classified which aim to protect the environment from pollution or degradation

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<b>Natural Resource Category</b>	<b>Activity</b>
Inland Water	Activities related to water supply, such as distribution, regulation, treatment of drinking water; irrigation (e.g. construction/maintenance of irrigation network for farmers, construction/maintenance of ground water pumps, water reticulation areas, etc) Water assays for viable land Research for new water supplies. Activities aimed at lowering water consumption (e.g. development and administration of measures to reduce or regulate the timing or quantity of water consumed by households/businesses; public education campaigns to raise awareness of water conservation issues, etc)
Land Management and Development	Activities involving management or use of land to provide an economic or social service, including: Assessment of development applications Rezoning decisions (including changes from one economic use to another economic use) Establishment and maintenance of public parks and street trees Maintenance of nature strips along streets/roadsides
Other Management Activities	Quarrying to provide raw materials for council works (e.g. gravel quarrying for road construction / maintenance) Activities / programs aimed at finding/developing alternative energy resources (such as R&D on alternative sources of energy generation) Energy audits of council activities

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## Appendix 5. Costs associated with EPE survey

An example of costs associated with an industry EPE industry survey:

### Service Industries

Sample size 1 : 5301	\$25 / unit = \$132,525 \$10,000 tech apps <b>Quote \$142,525</b>	provider load = approx 2650.5 hours
Sample size 2: 3304	\$25 / unit = \$82,600 \$10,000 tech apps <b>Quote \$92,600</b>	provider load = approx 1652 hours
Sample size 3: 2483	\$25 / unit = \$62,075 \$10,000 tech apps <b>Quote \$72,075</b>	provider load = approx 1241.5 hours